STEELHEAD HARVEST ANALYSIS
1982-83

by

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ABSTRACT

For the past seventeen years, at the end of the angling licence year, a questionnaire has been sent to the British Columbia steelhead fishermen requesting information on their fishing activity and catch success for incorporation into the Steelhead Harvest Analysis. Over this time, there have been considerable changes in licence sales, the number of days spent fishing and provincial catch.

In the 1982-83 season, 20,856 steelhead angling licences were sold, approximately 10% of which were to non-residents of B.C. A questionnaire was sent to 62% of licencees, and a response was received from approximately half of those contacted. Of the respondents, 72% fished for steelhead at least once, and of the active anglers, 54% were successful in landing a fish. The number of steelhead kept averaged 18% of the total reported catch for the province, ranging from 11% on Vancouver Island to 45% in the Thompson-Nicola region. Of the anglers who successfully landed a steelhead, 26% released all their fish, 69% kept between one and five fish and 5% kept more than five fish. Angling effort was highest in the Skeena region marginally surpassing that of Vancouver Island, however, Vancouver Island reported the highest number of steelhead caught. Hatchery fish, caught primarily on Vancouver Island and the Lower Mainland, comprised approximately 10% of the total provincial catch with a reported harvest ratio of 29%, compared to 17% for wild fish.

There has been a decreasing trend in licence sales, active anglers and angling effort over the seventeen year period, although the number of successful anglers has remained relatively constant. The provincial catch has been on an upswing for the last three years with this year's catch of 74,109 fish surpassing any previous records. The increase in catch is a combined result of increased stock abundance and repeated captures of released fish. Catch per angler day for the province was 0.52. Reduced possession limits as well as steelhead release regulations have resulted in a decrease in the steelhead harvest (number of fish kept), dropping from 63% in 1970-71 to 18% in 1982-83.

A second mailing of the questionnaire to non-respondents increased the response rate to 70% and decreased the first mailing estimates of active anglers, successful anglers, angler days and total catch by 4, 6, 6, and 8%, respectively, suggesting the possibility of response bias in first mailing results. However, a follow-up telephone survey of steelhead fishermen residing on Vancouver Island, who did not respond to either mailing, showed little evidence of response bias.

Forecasts of wild steelhead returns to Vancouver Island in 1983-84 are favourable despite flood events in 1979 and 1980 that had a negative impact on some rivers. In the Lower Mainland, a major 1980 flood in the Hope/Chilliwack area could result in suppressed runs over the next two years, however, catch and release as well as hatchery fish introductions would help offset the decline. Returns to the Thompson River will depend on the number of steelhead intercepted in the commercial and Indian food fisheries. The Cariboo region expects an average return of steelhead to coastal streams over the next few years. Exceptions are the Atnarko/Bella Coola River which could be slightly above average, and the Dean River which is expected to be below average due to few spawners in the late 1970's. Major flood events throughout the Skeena area in 1978, will be reflected as below average runs from 1983 to 1985. Similarly, extreme freshets on the Queen Charlotte Islands, compounded by a depressed 1978-79 brood year, are expected to result in suppressed returns during the 1984-85 and 1985-86 seasons.

ACKNOWLEDGEMENTS

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INTRODUCTION

Anglers from British Columbia, Canada and the United States have reported catches ranging between forty and seventy thousand steelhead trout annually from British Columbia streams. Due to the low natural abundance of wild sea-run trout, careful management is necessary to regulate the harvest and ensure adequate spawning. The number of steelhead released has increased considerably in recent years through the institution and growing acceptance of catch and release regulations and reduced bag limits. Many streams have been stocked with hatchery reared fry and smolts as a method of enhancing steelhead populations, and while numerous streams have a wild steelhead release restriction, the harvest of hatchery fish is still permitted.

Steelhead trout are caught in the commercial, sport and Indian food fisheries. The total catch is unknown, but efforts are being made, through the Salmonid Enhancement Program (S.E.P.), to determine the number of steelhead caught by sport anglers and in the commercial salmon fleet. An analysis of the number of steelhead caught by freshwater sport fisherman has been conducted annually since 1966-67 in the form of a mail-out questionnaire survey. Anglers are requested to report their catch for each stream fished during the licence year (April 1 to March 31).

The resident area boundaries within the province have been altered this year to coincide with the regional management boundaries. As a result, the Queen Charlotte Islands and the Skeena Mainland, previously treated as separate resident areas, are now considered as one. However, for comparison of this year's and previous year's data, catch and angling effort for the Skeena region has been divided according to the two resident groups.

Response bias, is believed to be a major factor in introducing error into the estimates of catch and angler effort, so a "follow-up" mailing of the questionnaire was undertaken, as well as a telephone survey of non-respondents, in an effort to arrive at a correction factor to be applied to first mailing estimates. The results and discussion in this report are based on first mailing responses. A separate section in the discussion deals with the results of the follow-up mailing and telephone survey.

Forecasts of steelhead returns, introduced last year for Vancouver Island and the Lower Mainland, have been expanded to include the Thompson-Nicola, Cariboo, Skeena and Queen Charlotte Islands.

SALMONID ENHANCEMENT PROGRAM

The Federal/Provincial Salmonid Enhancement Program (S.E.P.) was initiated in 1977 with the long term objective of doubling the catch of Pacific salmon, steelhead and sea-run cutthroat trout by protecting, rehabilitating and enhancing fish stocks. Surveys of stocks in the late 1970's revealed that many runs of steelhead were declining, particularly in southern British Columbia. Projects are underway to restore these runs through improved management and various enhancement techniques. The Fish and Wildlife Branch is also working intensively with the Federal Department of Fisheries and Oceans to reduce the incidental catch of steelhead by refining the management of the commercial salmon fishery.

Enhancement techniques include the improvement of fish habitat, removal of barriers to fish migration, construction of spawning platforms to increase

Table 1. 1982 Juvenile steelhead releases from provincial (F&W) and federal (DFO) rearing facilities.

Stream	Facility	Fry Released	Smolts Released	Predicted Adult Returns*
VANCOUVER ISLAND				
Big Qualicum R.	Big Qualicum Salmon Hatchery (DFO)		26,900	1,076
Cameron L.	Big Qualicum Salmon Hatchery (DFO)		2,100	?
Campbell R.	O'Connor Lake Netpens (F&W)		12,000	360 s.r.
Chase R.	Big Qualicum Salmon Hatchery (DFO)		7,700	308
Cowichan R.	Cowichan Lake Netpens (F&W)		3,300	132
Cruikshank R.	Puntledge Salmon Hatchery (DFO)	10,700		54
Englishman R.	Big Qualicum Salmon Hatchery (DFO)		22,700	908
Keogh R.	O'Connor Lake Netpens (F&W)		31,000	1,240
Little Qualicum R.	Big Qualicum Salmon Hatchery (DFO)		25,700	1,028
Millstone R.	Big Qualicum Salmon Hatchery (DFO)		15,000	600
Nanaimo R.	Nanaimo C.D.P. Hatchery (DFO)	41,300		330
Oyster R.	Rosewall Research Hatchery (DFO)	35,100	16,800	953
Puntledge R.	Puntledge Salmon Hatchery (DFO)	9,800	24,800	793 s.r.
			39,000	1,560
Quinsam R.	Quinsam Salmon Hatchery (DFO)	47,200	17,600	1,082
Rosewall Cr.	Rosewall Research Hatchery (DFO)		26,100	1,044
Salmon R.	Quinsam Salmon Hatchery (DFO)	44,600		223
Somass R.	Robertson Cr. Salmon Hatchery (DFO)		41,800	1,254 s.r.
			24,000	960
Stamp R.	Robertson Creek Hatchery (DFO)		156,100	4,683 s.r.
LOWER MAINLAND				
Alouette R.	Alouette Reg. Correctional Centre (F&W)		5,900	236
	Fraser Valley Trout Hatchery (F&W)	2,700	20,100	826
Ashlu R.	Fraser Valley Trout Hatchery (F&W)	69,300		555
Capilano R.	Capilano Salmon Hatchery (DFO)	16,700	1,500	194
Centre Cr.	Chilliwack R. Hatchery (DFO)	11,400		91
Chilliwack R.	Chilliwack R. Hatchery (DFO)		66,200	2,648
Coquihalla R.	Fraser Valley Trout Hatchery (F&W)	47,400	48,200	1,825 s.r.
Little Campbell R.	Fraser Valley Trout Hatchery (F&W)	5,600		45
	Surrey Rearing Ponds (F&W)		4,000	160
Marshall Cr.	Fraser Valley Trout Hatchery (F&W)	8,800	2,700	152
Nicomekl R.	Fraser Valley Trout Hatchery (F&W)		14,900	596
Seymour R.	Seymour River Rearing Channel-BCIT (DFO)	10,500	1,100	128
			4,900	147 s.r.
Silverhope Cr.	Fraser Valley Trout Hatchery (F&W)	165,300		1,323 s.r.
Squamish R. (Shovelnose Cr.)	Fraser Valley Trout Hatchery (F&W)	12,200		98
THOMPSON-NICOLA				
Bonaparte R.	Loon Creek Hatchery (F&W)		38,500	192**
Nicola R. (Maka & Spius Cr.)	Loon Creek Hatchery (F&W)	38,000		190
CARIBOO				
Hotnarko L.	Snootli Salmon Hatchery (DFO)	24,000		120
Little Chilcotin R.	Hanceville Pilot Facility (F&W)	34,000		170
Salloomt R.	Snootli Salmon Hatchery (DFO)	49,100	7,600	550
SKEENA				
Kitimat R.	Kitimat R. Hatchery (DFO)	26,500		212
Pallant Cr.	Pallant Cr. Hatchery (DFO)	4,100		33
Suskwa R.	Fraser Valley Trout Hatchery (F&W)	48,300		386
PROVINCIAL TOTAL:		765,400	752,800	29,465

* Predicted adult returns based on Tautz & Slaney, 1982, Biostandards, which do not take into account hatchery smolts that residualize (do not migrate to sea).

Fry to adult survival: fry 1.0g 0.5%
fry > 1.0g 0.8%

Smolt to adult survival: summer-run 3%
winter-run 4%

** Bonaparte R. smolts averaged 17.5g. Smolt to adult survival estimated at 0.5%. (Royal, 1972)

available spawning habitat, and placement of boulders or log cover in streams to increase rearing habitat for juvenile fish. Other techniques in a research phase include stream enrichment to increase the natural production of aquatic invertebrates; water storage in headwater lakes for release during the dry summer months to maintain optimum flow conditions for fish; and stabilization of streambanks by reestablishing riparian vegetation, reinforcing with rip-rap, or fencing to eliminate livestock.

Fish culture plays a major role in S.E.P. through annual stocking programs to accelerate the recovery of severely depleted wild stocks and by sustaining major sport fisheries. Steelhead fry are released in underseeded areas of streams or above barriers (i.e. waterfalls), thus, maximizing the use of available rearing habitat. Steelhead smolts are reared at hatcheries or in floating net enclosures in lakes where they are fed artifically for one year until a size of about 18cm is reached. The hatchery smolts migrate to sea upon release. The first adult returns from hatchery smolts released in 1982 will be during the 1983-84 fishing season, while fry released in 1982 will not return until the 1985-86 and 1986-87 seasons (Table 1).

Although there are planned exceptions, Fish and Wildlife Branch policy directs that hatchery reared steelhead be returned to their stream of parental origin and that, whenever possible, eggs are taken from wild fish rather than marked hatchery fish. Exceptions may be found in streams classified as "hatchery" (see below). Hatchery fish are marked by the removal of the adipose fin and have a healed scar in place of that missing part.

Concern about the impact of hatchery fish introductions on wild fish populations resulted in the development of a system of stream classification, based on expected genetic risk, to guide in the management of fish stocks. Three broad classes were developed:

Wild streams are managed to protect, maintain and enhance natural fish populations. Appropriate enhancement techniques include fry plants and short term smolt plants using native brood stock, stream improvement to increase stream carrying capacity, and regulations to control the harvest.

Hatchery streams have severely depleted wild stocks and may also have damaged spawning and rearing habitat, but there is potential for angling through the annual introduction of smolts.

Augmented streams are managed to maintain healthy wild stocks while providing for a harvestable surplus through the addition of cultured fish. The risk of genetic mixing between wild and hatchery fish is minimized by using only native wild adults for brood stock. Smolts are released in the lower stream reaches where angling pressure is greatest. Hatchery adults return to their release point and are available for anglers to harvest while release regulations for wild fish ensure an upriver escapement. Stream improvement and fry stocking may also be used as a method of enhancement in augmented streams.

Sport fishing regulations are one of the most effective management strategies employed by fisheries biologists to protect, maintain and enhance steelhead stocks. Catch and release restrictions are in frequent use, while complete

Fig. 1. British Columbia resident areas.

angling closures are limited to specific areas where fish are in critical need of protection. Catch and release regulations have resulted in substantially increased spawning escapements and juvenile recruitment essential to the restoration of steelhead stocks.

METHOD

Information for the Steelhead Harvest Analysis was obtained from a postcard questionnaire survey of anglers who purchased steelhead licences in British Columbia. The questionnaire asked for the following information:

1. Did you fish for steelhead between April 1, 1982, and March 31, 1983, and
2. List the streams fished and, for each, the number of days fished, the number of wild steelhead kept and released, and the number of hatchery steelhead kept and released.

A total of ten resident groups were recognized: residents of eight regions of the province, residents of the other provinces and residents from outside of Canada (Fig. 1). Questionnaires were mailed to 58% of B.C. resident anglers and 95% of non-B.C. resident anglers. The returned questionnaires were analysed to determine catch, angling effort and angler distribution for all streams fished.

Non-respondents were sent a second questionnaire, designated by a number 2 in the corner to distinguish first and second mailing responses. An analysis was completed combining the results of both mailings.

A subsample of Vancouver Island licencees who did not respond to either mailing were contacted by telephone. A questionnaire was completed, over the phone, for each angler contacted to determine the angling activity of non-respondents. Comparisons were made of the fishing activity at the three levels of sampling.

RESULTS

During the 1982-83 season, 20,856 steelhead angling licences were sold with Lower Mainland residents making up the largest segment (31%) of steelhead anglers. Questionnaires were mailed to 62% of licencees, and responses were received from approximately half of those contacted. The resulting sample group constituted 30% of all licenced steelheaders (Table 2).

Of the respondents, 72% actually fished for steelhead and, of these, 54% reported catching at least one fish. When extrapolated to include all anglers, an estimated 7,686 of 14,475 active anglers were successful in catching a steelhead (Table 3). Of the successful anglers, 1,969 (26%) released all fish caught, 5,293 (69%) kept from one to five fish and 424 (5%) took home more than five fish (Table 4).

All rivers in the province, except the Thompson, Dean and Kispiox rivers, attracted the largest portion of steelhead anglers from within the region. Similarly, on most rivers, the bulk of the steelhead catch was by anglers residing in the area. This was particularly true for rivers on the Lower Mainland and Vancouver Island where 88 and 90% of the catch was by area residents, respectively. Two major exceptions were the Thompson and Dean rivers where the highest catch was by visiting anglers (data on file).

Table 2. Number of steelhead licencees, questionnaires and respondents by resident area.

Resident area	A Licencees	B Questionnaires mailed	C Response	D Not useable*	E Response rate (%) (C/B-D)	F Licencees sampled (%) (C/A)
Vancouver Island	4,532	2,624	1,046	194	43	23
Lower Mainland	6,375	3,658	1,647	274	49	26
Thompson-Nicola	885	519	295	23	59	33
Kootenay	176	102	60	5	62	34
Cariboo	944	559	258	25	48	27
Skeena	4,136	2,414	1,115	158	49	27
Omineca-Peace	1,271	758	399	39	55	31
Okanagan	529	309	186	11	62	35
Non-Resident Canadians	684	684	393	18	59	57
Non-Resident Aliens	1,324	1,214	754	42	64	57
Total	20,856	12,841	6,153	789	51	29.5

*Includes questionnaires that:

1. were returned by the post office as undeliverable
2. were spoiled
3. reported fish collected for hatchery brood stock

Table 3. Estimate of active and successful steelhead anglers by resident area.

Resident area	Licencees	Active anglers	Active anglers (%)	Successful anglers	Successful anglers (%)
Vancouver Island	4,532	2,887	64	1,856	64
Lower Mainland	6,375	4,214	66	1,900	45
Thompson-Nicola	885	672	76	278	42
Kootenay	176	153	87	76	50
Cariboo	944	695	74	321	46
Skeena	4,136	2,833	68	1,544	54
Omineca-Peace	1,271	819	64	363	44
Okanagan	529	421	80	156	37
Non-Resident Canadians	684	588	86	266	45
Non-Resident Aliens	1,324	1,193	90	926	78
Total	20,856	14,475	71.6	7,686	54.3

Just over half of all active steelhead anglers spent between one and five days fishing. The majority of resident anglers from areas with a large number of steelhead streams (Vancouver Island, Lower Mainland and Skeena) generally spent over five days angling for steelhead. Out of province residents and residents of areas in the province where there are few or no steelhead streams, generally fished for only one to five days (Table 5).

Fishing effort was highest in the Skeena region, closely followed by Vancouver Island. The total estimated provincial catch was 74,109 steelhead with Vancouver Island providing the largest catch of both hatchery and wild fish. The provincial catch per angler day averaged 0.52 (approximately two days of angling per fish caught) (Table 6).

Anglers kept an average of 18% of the provincial steelhead catch, ranging from a low of 11% on Vancouver Island (under special regulation to limit harvest) to a high of 45% in the Kamloops area. The Thompson River was the most heavily fished stream in the province and accounted for almost all of the steelhead caught in the Thompson-Nicola area. The largest reported total catch (kept and released) was on the Gold River (5,887), followed by the Dean (5,498), Chilliwack/Vedder (4,725) and Bulkley (4,654) rivers (Table 7; Appendix 1).

The number of hatchery fish reported caught on Vancouver Island and the Lower Mainland increased over last year. Reports of hatchery fish in other regions must be carefully scrutinized since adult returns from recent fry plants are unlikely to occur before 1984-85. Hatchery fish comprised approximately 12% of the provincial catch. The reported release ratio for hatchery fish averaged 71% compared to 83% for wild fish (Appendix I).

The response rate to the 1982-83 survey, after the second mailing, increased from 51% to 70%, and the combined mailing estimates of active anglers, successful anglers, angler days and total catch were less than first mailing estimates by 4, 6, 6 and 8%, respectively (data on file).

On Vancouver Island, 777 anglers did not respond to either mailing, and of 52 (7%) contacted by telephone, 32 (62%) were active and, of these, 22 (69%) were successful in landing a steelhead (Table 8).

Table 4. Successful anglers in each resident area according to the number of steelhead kept.

Number of Steelhead Kept	Successful Anglers										Total Successful Anglers	
	Vancouver Island	Lower Mainland	Thompson-Nicola	Kootenay	Cariboo	Skeena	Omineca-Peace	Okanagan	Non-Resident Canadian	Non-Resident Alien	No.	%
0	651	549	17	6	36	138	38	17	42	475	1,969	25.6
1-5	1,109	1,301	228	70	274	1,235	315	119	219	423	5,293	68.9
6-10	95	50	33	0	11	171	10	20	5	26	421	5.5
11-20	0	0	0	0	0	0	0	0	0	2	2	0.0
over 20	1	0	0	0	0	0	0	0	0	0	1	0.0
Total Anglers	1,856	1,900	278	76	321	1,544	363	156	266	926	7,686	100.0

Table 5. Active anglers in each resident area according to the number of angler days.

Number of Angler Days	Active Anglers										Total Active Anglers	
	Vancouver Island	Lower Mainland	Thompson-Nicola	Kootenay	Cariboo	Skeena	Omineca-Peace	Okanagan	Non-Resident Canadian	Non-Resident Alien	No.	%
1-5	1,218	1,953	384	100	468	1,146	599	299	374	602	7,143	50.7
6-10	576	848	153	41	132	649	137	65	132	420	3,153	22.9
11-30	698	983	114	12	73	697	73	46	61	139	2,896	18.6
Over 30	334	306	15	0	11	256	0	11	5	21	959	5.7
Unknown	61	124	6	0	11	85	10	0	16	11	324	2.1
Total Anglers	2,887	4,214	672	153	695	2,833	819	421	588	1,193	14,475	100.0

Table 6. 1982-83 Angling effort and steelhead catch distribution*

Area	Angler days	Wild		Hatchery		Total catch	Kept/day	Catch/day**
		Kept	Released	Kept	Released			
Vancouver Island	41,454	1,370	21,389	1,885	4,925	29,569	0.080	0.718
Lower Mainland	35,486	810	7,186	574	1,123	9,693	0.039	0.271
Thompson-Nicola	13,700	1,920	2,335	22	31	4,308	0.143	0.312
Cariboo	9,305	1,269	7,017	27	112	8,425	0.133	1.080
Skeena - mainland	44,305	4,708	11,809	122	173	16,812	0.109	0.410
- Q.C.I.	4,134	728	4,332	0	0	5,060	0.177	1.234
Omineca-Peace	7	0	0	0	0	0	0.000	0.000
Unknown streams	804	44	191	4	3	242	0.059	0.267
Total	149,195	10,849	54,259	2,634	6,367	74,109	0.094	0.517

* From Appendix 1.

** Combined kept and released.

Table 7. Steelhead streams having the highest total catch in 1982-83.

Streams	Angler days	Kept	Released	Total catch	Kept/ day	Catch/ day
VANCOUVER ISLAND						
Gold	4,299	193	5,694	5,887	0.045	1.370
Stamp	4,959	595	3,359	3,954	0.120	0.792
Campbell/Quinsam	6,165	447	2,029	2,476	0.070	0.401
Big Qualicum	4,680	413	1,885	2,298	0.091	0.500
Little Qualicum	2,896	310	1,519	1,829	0.109	0.530
Cowichan	2,849	208	1,673	1,881	0.076	0.680
LOWER MAINLAND						
Chilliwack/Vedder	10,953	264	4,461	4,725	0.024	0.429
Alouette (South)	3,291	181	1,145	1,326	0.055	0.403
Fraser	9,100	424	181	605	0.047	0.069
Squamish	1,526	83	323	406	0.054	0.272
Seymour	1,627	24	322	346	0.014	0.210
Little Campbell	1,245	85	259	344	0.068	0.276
THOMPSON-NICOLA						
Thompson	12,176	1,826	2,325	4,151	0.151	0.337
CARIBOO						
Dean	3,664	475	5,023	5,498	0.116	1.654
Atnarko/Bella Coola	4,824	685	1,556	2,241	0.145	0.414
SKEENA (mainland)						
Bulkley	10,816	1,385	3,269	4,654	0.129	0.451
Morice	5,562	666	2,004	2,670	0.113	0.542
Skeena	9,945	1,045	1,034	2,079	0.114	0.220
Babine	1,831	105	1,718	1,823	0.044	1.030
Kitsumkalum	4,037	459	1,007	1,466	0.114	0.360
QUEEN CHARLOTTE ISLANDS						
Yakoun	2,330	480	2,567	3,047	0.201	1.307
Pallant Cr.	293	17	511	528	0.095	1.917
Copper Cr.	582	41	470	511	0.070	0.873
Mamin	216	67	234	301	0.310	1.397

Table 8. Estimates of active and successful steelhead anglers from Vancouver Island for the three levels of sampling.

	A	B	C	D	E	F	G	H
	Licencees	Response	Reported active anglers	Active anglers % (C/B)	Estimated active anglers (AD)	Reported successful anglers	Successful anglers % (F/C)	Estimated successful anglers (EG)
1st mailing	4,532	1,046	666	64	2,887	428	64	1,856
2nd mailing	4,532	470	244	52	2,352	146	60	1,406
Telephone survey	4,532	52	32	62	2,787	22	69	2,917
Combined results	4,532	1,568	942	60.1	2,724	596	63 3	1,724

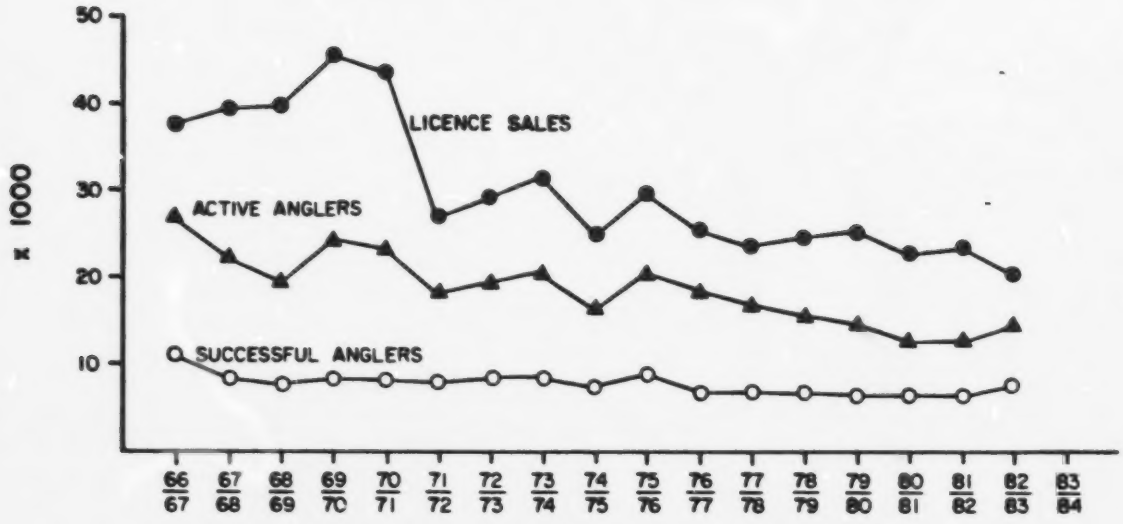

Fig. 2. Annual variations in steelhead licence sales and the number of active and successful steelhead anglers in British Columbia since 1966/67.

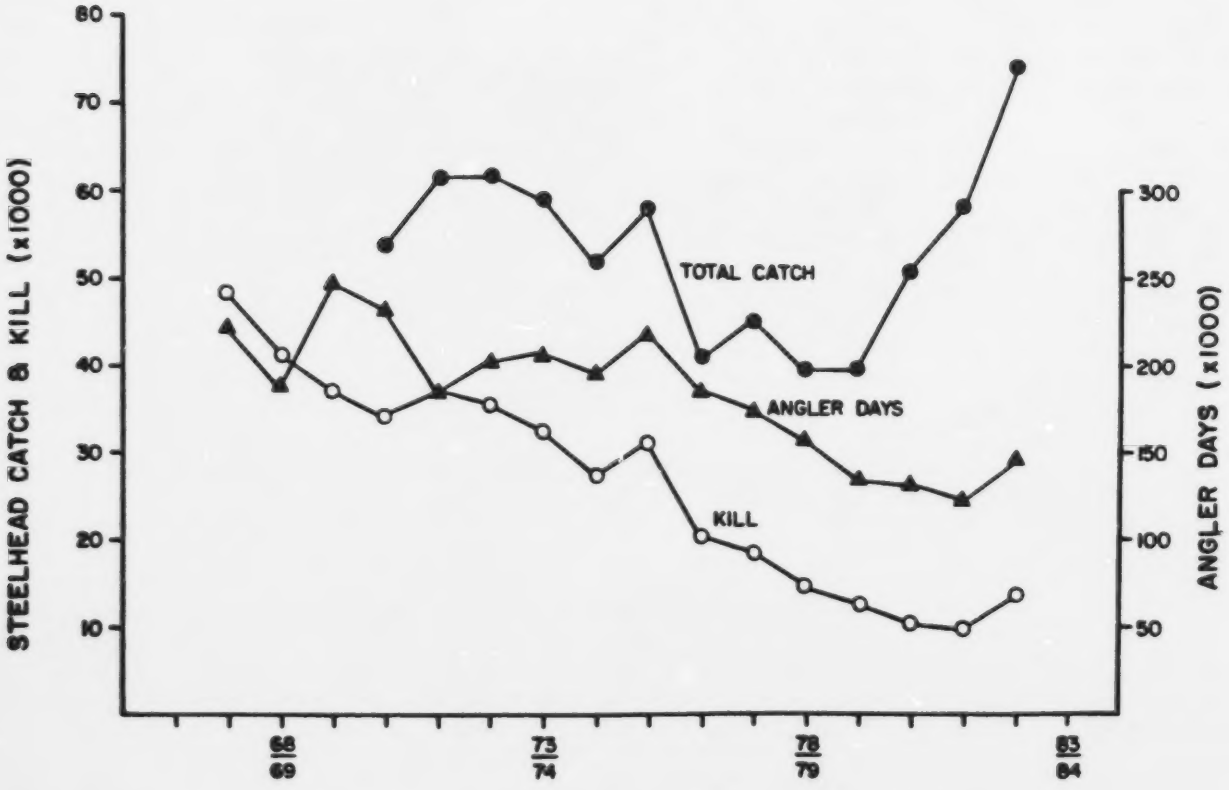

Fig. 3. Steelhead angling effort and catch success since 1967/68.

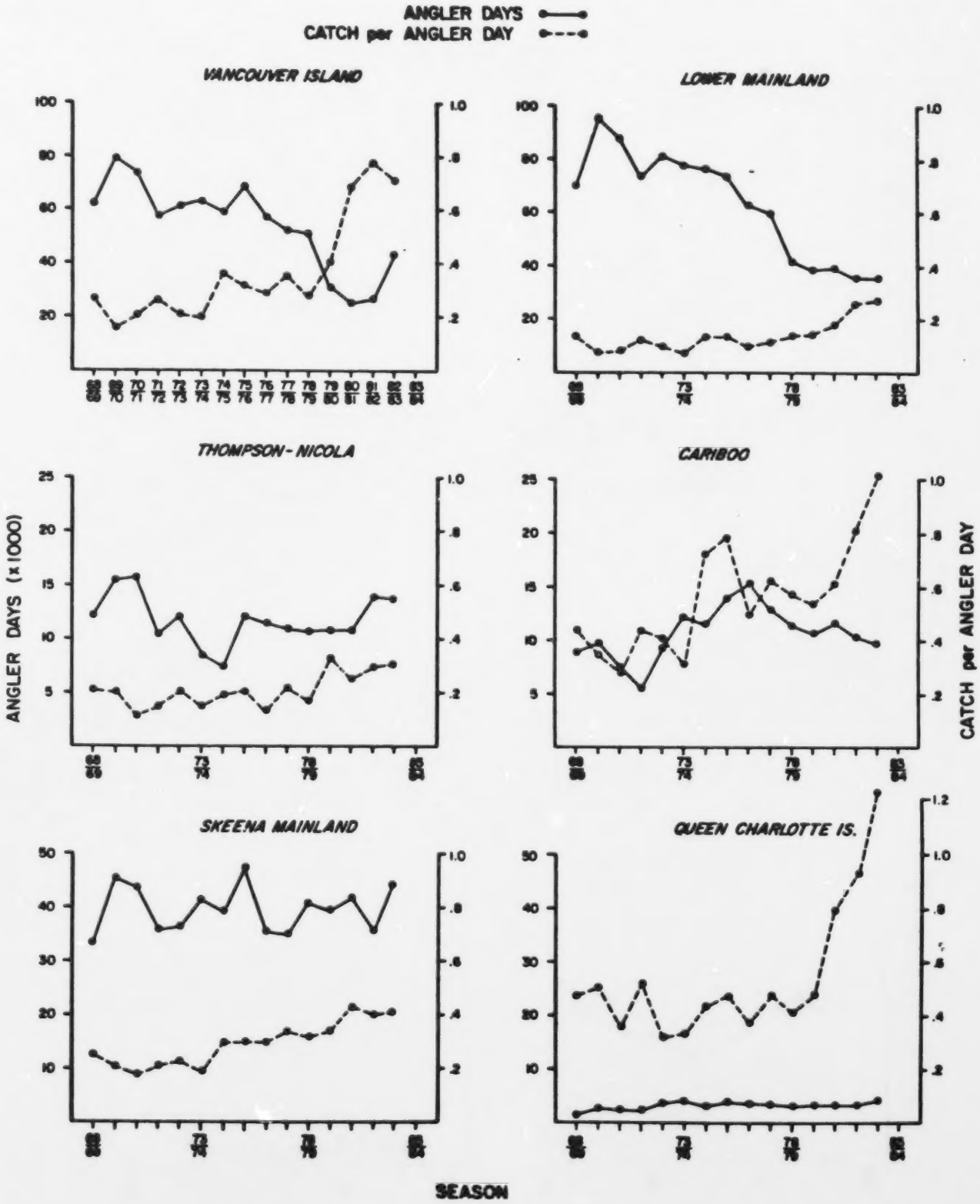

Fig. 4. Trends in steelhead angling effort and catch success for each area containing steelhead streams.

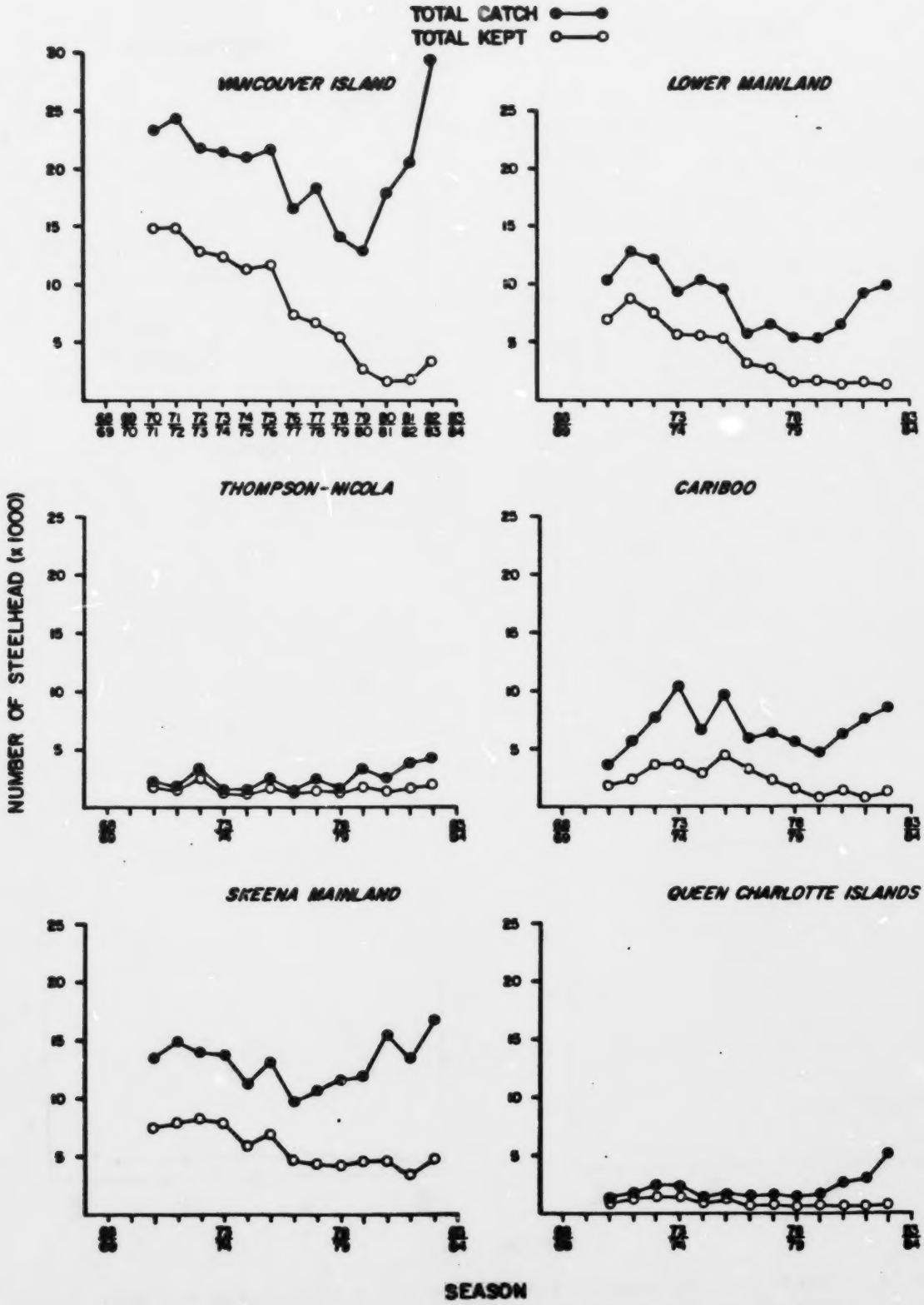

Fig. 5. Trends in total steelhead catch and kept for each area containing steelhead streams.

DISCUSSION

TRENDS IN CATCH AND ANGLING EFFORT

While the annual reported catch has fluctuated between 39,500 and 74,000 fish since 1966, there has been a steady decrease in licence sales and the number of active anglers. The number of successful anglers, however, has remained relatively constant suggesting that the least successful anglers probably drop out leaving the streams available to a group of more experienced fishermen (Fig. 2). A significant increase in the provincial steelhead catch this year, resulted in an average catch of 9.6 fish per successful angler; the highest on record. The increase in total catch also meant that it took less angling effort to land a fish, with an average of only 2.0 days of angling required per fish caught; the lowest on record (Appendix 2).

The provincial steelhead catch has recovered dramatically over the past three years. This is partially due to an increase in stock abundance as well as from repeated captures of released fish. The number of fish kept, on the other hand, has declined considerably, dropping from 63% in 1970-71 to 18% in 1982-83 as a result of reduced quotas and wild steelhead release regulations. Angler philosophy is changing as more fishermen realize that the future status of our steelhead stocks depends on maintaining a lower rate of harvest (Fig. 3; Appendix 3).

There was a significant upswing in angling effort on Vancouver Island this year after a three year slump. The Skeena Mainland also showed an increase in the number of angler days over last year while other areas remained relatively constant. Catch per angler day, which is a reflection of angling effort and total catch, remained elevated in all regions with a noticeable improvement in the Cariboo and Queen Charlotte Islands (Fig. 4). All areas, but particularly Vancouver Island, showed an increase in total catch (Fig. 5).

RESPONSE BIAS

Steelhead biologists in Oregon and Washington conducting mail-out questionnaire surveys of steelhead angling success have found a "positive response bias" in their results. In British Columbia, comparative results of the Steelhead Harvest Questionnaire and on-site creel surveys suggest a similar bias indicating that the questionnaire may be producing inflated estimates of the steelhead catch (both kept and released). For those streams receiving over 400 angler days per year (the larger, more popular streams), the kill estimates from the questionnaire were 32% higher than estimates obtained from on-site creel surveys. The range in error is considerable (from 4% to 63%) indicating that the 32% over-estimate should be applied selectively (Steelhead Harvest Analysis 1978-79, Fish and Wildlife Bulletin No. B-8). Creel survey results also indicate that estimates of fish released and angler days are even more inflated than estimates of steelhead kept. Few anglers maintain a permanent record of fish released or the number of days spent fishing, so guesswork is often the only answer. There is also the likelihood of some frivolous responses.

The comparison of creel survey and questionnaire results are not always reliable. Creel survey techniques vary from intense sampling (Dean and Thompson rivers) and random interviews (Campbell and Quinsam rivers) to voluntary angler

reports (Keogh and Chilcotin rivers). The results range from accurate to indicative, reflecting considerable differences when compared to the questionnaire survey.

Throughout the years, the results of the Steelhead Harvest Analysis have been derived from a 50% response rate to a single mail-out of the questionnaire. It has generally been assumed that the keenest, most active, and most successful anglers are the ones most likely to complete the questionnaire. If this was the case, when the number of fish reported caught was extrapolated to include all anglers, the resulting estimates would be inflated or positively biased due to the poor representation of inactive or dissatified anglers.

In 1978-79, and again this year, a second mailing of the questionnaire was undertaken to increase the response rate and, thus, arrive at more accurate estimates of angling activity and success. When the results of both mailings were combined, a decrease in the estimates of active anglers, successful anglers, angler days and total catch supported the possibility of response bias. If the majority of the remaining non-respondents were found to be inactive or unsuccessful, as generally assumed, the estimates of active and successful anglers from the first mailing would be reduced considerably more.

This year, further effort was made to analyse the fishing activity of non-respondents to determine if response bias was significant and, if so, to arrive at a correction factor to be applied to first mailing estimates. A telephone survey was conducted of a random sample of Vancouver Island resident anglers who did not respond to either mailing. It was unfeasible to contact non-respondents from all resident areas due to the large sample size required and limited time constraints, however, it was feasible to select a random sample of non-respondents from one region and assume that other areas would have a similar response.

The results of the telephone survey did not show the expected further decrease in the proportion of active and successful anglers. In fact, there was a substantial increase over the results of the second mailing. Recalculating the number of active and successful Vancouver Island anglers, based on the combined reports of the two mailings and telephone survey, showed numbers to be less than first mailing estimates by only 5.6 and 7.1%, respectively--considerably less than creel census results have indicated (Table 8).

It was not possible, with the small representation of anglers contacted in the telephone survey, to recalculate estimates of steelhead catch for each stream fished. However, since the ratio of active and successful anglers remained relatively constant at all response levels, it might be safe to assume that catch estimates from the first mailing are reliable.

Given that the results of the telephone survey were not as anticipated (possibly due to the small sample size and emphasis on one region), it would be worthwhile to examine, more closely, the angling activity of a large number of non-respondents from all resident areas.

STEELHEAD FORECASTS

S.E.P. has provided the Fish and Wildlife Branch with a greater capability to manage steelhead trout stocks by annually assessing adult and juvenile populations in several key streams throughout the province. However, annual variations in

ocean survival, age at return and the interception of summer steelhead in the commercial salmon fishery cause unpredictable variations in run strength. Therefore, forecasts are used only as a guide until further work allows the refinement of various indicators.

Several sets of information are used to estimate adult returns, including (1) the number and size of wild, winter steelhead smolts enumerated from 'index' streams two and three years prior to the forecast year, (2) the number of wild, summer steelhead counted in several representative streams that are surveyed annually, (3) past wild steelhead catch data together with stream flow records during the first year after spawning (e.g. flood conditions in the spring and/or autumn reduce fry survival resulting in poor adult returns five years later), (4) regulation changes that influence angler harvest, and (5) the number, size and quality of hatchery steelhead smolts released two and three years prior to the forecast year.

Vancouver Island

Snorkel survey counts of summer steelhead in 1983 equalled or exceeded previous highs in most indicator streams. Considering that these fish generally originate from the same brood year as do their winter steelhead counterparts, this suggests that, on average, the 1983-84 winter's returns will be as good as was experienced in 1982-83, the best year on record.

Predictions based on catch, escapement and stream flow records indicate smaller and more variable returns. Serious floods during the November/December period in 1979 and 1980 will likely have a large influence on the number of four and five year old adults which are expected back this winter. However, the severity of the 1979 and 1980 floods was localized and not all streams were affected equally. Streams on the southern half of the Island, particularly the Little Qualicum, Englishman, and Nanaimo, were relatively heavily impacted. Other major producers, notably the Campbell/Quinsam and Gold rivers, were only moderately influenced. Catch and release regulations, which were in effect at the time of these flood events, will probably reverse the consequences to some extent.

Smolt emigration data collected at Quinsam River in the spring of 1981 and 1982 suggests that returns to neighbouring streams in the 1983-84 fishery will be near recent averages.

Hatchery steelhead production will augment wild steelhead returns in the Cowichan, Englishman, Little Qualicum, Big Qualicum, Puntledge, Oyster, Campbell, Quinsam, Keogh, and Somass (Stamp) rivers. Returns to Cowichan are expected to reach their full potential in 1984-85. Catches should be particularly good in the Big and Little Qualicum, Puntledge and Somass rivers. The Millstone River, near Nanaimo, should have an excellent return, but this fishery is restricted to the under 16 over 65 age group.

Lower Mainland

On Boxing Day, 1980, a major flood event occurred affecting streams throughout the Lower Mainland region, but especially those in the Hope, Chilliwack and Agassiz area. These high flows, which were particularly detrimental to under-yearling juvenile fish, will likely be reflected as suppressed runs of wild steelhead in 1984-85 and, moreso, in 1985-86. However, hatchery adult returns on some streams

may tend to offset the negative impact of the 1980 flood event. Wild steelhead release regulations on the Vedder, Coquitlam and South Alouette rivers since 1978-79, resulted in increased spawning escapements and, thus, should also help to cancel some of the flood impact.

The first significant returns of winter-run adults from the B.C.I.T. hatchery program on the Seymour River should occur in the 1983-84 winter fishery. This will also be the second year of hatchery reared, summer-run fish from this program. Hatchery returns of summer steelhead are also expected for the Coquihalla, Silverhope and Capilano rivers.

The Coquihalla River suffered three disasterous events between 1979 and 1982 which had a deleterious impact on recruitment and juvenile survival. A pipeline development in 1979 resulted in the release of fine materials to the river, thus, decreasing egg to fry survival in the spring of 1980 and increasing over-wintering mortality of juveniles. Further complications occurred when a major flood was experienced (December 26, 1980) causing increased mortalities for over-wintering juveniles. This was further compounded by a serious mine pollution problem in the spring of 1982. Despite average or higher than average wild adult returns to the Coquihalla during these years, the poor survival of their progeny will be reflected as fewer returning adults than originally anticipated. The 1985-86 run is predicted to be the lowest ever. Considerable improvement is expected the following year even though predictions have been reduced by 30% due to the mine pollution problem.

Thompson-Nicola

Steelhead harvest forecasts or return-to-the-river forecasts for the Thompson-Nicola region are difficult to predict because of the major impact outside interception fisheries (i.e. commercial in Juan de Fuca and Johnston Straits and Indian food fisheries) can have on escapement. If there is no significant increase in commercial or Indian food fisheries at times of migration of Thompson River stocks, then a gradual improvement in fish numbers for the next three years can be expected. In addition, because of enhancement efforts from Loon Creek Hatchery, the 1984 season should provide anglers with the first significant returns of adult steelhead resulting from the first smolt releases to Bonaparte River.

Other steelhead rivers in the region, such as Bridge, Stein, Seton and Nahatlatch, will continue to be poor because of heavy impact by Indian food fisheries in the Fraser River during March and April when these stocks normally enter their natal streams.

Cariboo

Coastal streams in the Cariboo region can expect an average run of winter steelhead during the 1983-84 season. This trend is expected to continue into the 1984-85 season due to low numbers of spawners in the cycle years (1978, 79, 80). The Atnarko-Bella Coola system may experience a slightly above average return since reduced sport catch limits and a moderate Indian food fishery harvest in 1978-79 allowed for an above expected spawner escapement. Angler success on the Bella Coola is expected to improve in the spring of 1985 as a result of fry and smolt plants in the Salloomt River. Summer-run returns to the Dean River could be below average due to low numbers of spawning adults in the late 1970's. In the interior, the Chilcotin River summer-run returns are expected to remain only fair, until 1986 when adults from 1981 fry plants return.

Skeena (Mainland)

Major floods occurred throughout the Skeena in November 1978 having a negative impact on the survival of the young of that year. Since the majority of Skeena summer steelhead return as 5 or 6 year olds, the flood effects will be reflected in the fisheries between 1983 and 1985. As expected, the 1983 run was well below average and, although some improvement should be seen, the 1984 run is also predicted to be less than average. Interceptions of steelhead in commercial salmon nets at the mouth of the Skeena, as well as in native Indian fisheries, have large impacts on escapements. Any changes in their catch, therefore, will drastically alter predictions of run strength.

Queen Charlotte Island

Below average steelhead returns are expected for the 1984-85 winter season. Extreme freshet events during the winters of 1979-80 and 1980-81, which affected the fry and subsequently the one year old juveniles of an already depressed 1978-79 steelhead brood year, are responsible for the conservative estimates.

Appendix 1. Estimated angler days and catch success, 1982-83.*

Stream Name	Days fished	No. anglers	WILD		HATCHERY		TOTAL CATCH		Kept/ day**	Catch/ day**
			Kept	Released	Kept	Released	Kept	Released		
VANCOUVER ISLAND:										
ADAM RIVER	13	4	0	13	0	0	0	13	0.000	1.000
AMOR DE COSMOS RIVER (BEAR RIVER)	198	98	9	116	0	0	9	116	0.043	0.630
APPLE CREEK	13	4	0	9	0	0	0	9	0.000	0.667
ASH RIVER	182	39	4	91	4	4	8	95	0.048	0.571
BEDWELL RIVER	13	4	0	0	0	0	0	0	0.000	0.000
BENSON RIVER	52	4	104	0	35	0	139	0	2.667	2.667
BIG QUALICUM RIVER	4680	670	51	906	362	979	413	1885	0.091	0.500
BLACK CREEK	24	12	0	4	0	0	0	4	0.000	0.125
BROWNS RIVER	4	4	0	0	0	0	0	0	0.000	0.000
BURMAN RIVER	26	13	0	48	0	0	0	48	0.000	1.833
CAMPBELL RIVER	3185	484	26	629	172	293	198	922	0.067	0.359
CAYCUSE RIVER	43	21	0	22	0	0	0	22	0.000	0.500
CAYEGHLE CREEK	4	4	0	22	0	0	0	22	0.000	5.000
CHEMAINUS RIVER	203	73	0	26	4	0	4	26	0.021	0.149
CHINA CREEK	35	22	0	17	0	0	0	17	0.000	0.500
CLUXEWE RIVER	411	78	61	664	9	55	70	719	0.165	1.897
COMUMA RIVER	45	14	0	45	0	0	0	45	0.000	1.000
COTTONWOOD CREEK	17	4	0	0	0	0	0	0	0.000	0.000
COUS CREEK	26	13	0	35	0	0	0	35	0.000	1.333
COWICHAN RIVER	2849	573	163	1583	45	90	208	1673	0.076	0.680
DE MAMIEL CREEK	9	4	0	0	0	0	0	0	0.000	0.000
EFFINGHAM RIVER	9	4	0	0	0	0	0	0	0.000	0.000
ENGLISHMAN RIVER	1343	292	0	750	55	98	55	848	0.041	0.683
EVE RIVER	130	50	9	147	2	0	11	147	0.083	1.306
FRENCH CREEK	198	67	4	88	0	0	4	88	0.021	0.489
GOLD RIVER	4299	597	176	5602	17	92	193	5694	0.045	1.370
GOLDSTREAM RIVER	132	28	13	61	0	0	13	61	0.097	0.548
GOODSPEED RIVER	505	60	26	48	0	0	26	48	0.051	0.145
GORDON RIVER	4	4	0	0	0	0	0	0	0.000	0.000
HARRIS CREEK	306	86	30	313	3	0	33	313	0.111	1.125
HEBER RIVER	364	52	0	450	0	4	0	454	0.000	1.250
JORDAN RIVER	13	4	0	0	0	0	0	0	0.000	0.000
KAIPIT CREEK	17	9	13	26	0	0	13	26	0.750	2.250
KAOUK RIVER	36	20	0	4	0	0	0	4	0.000	0.111
KEOGH RIVER	361	109	52	254	22	77	74	331	0.198	1.116
KENNEDY RIVER	4	4	0	0	0	0	0	0	0.000	0.000
KIRBY CREEK	26	17	0	4	0	0	0	4	0.000	0.167
KITSUCKSUS CREEK	48	9	0	69	0	0	0	69	0.000	1.455
KOKISH RIVER	239	54	4	187	0	0	4	187	0.018	0.804
KOKSILAH RIVER	336	58	30	106	0	4	30	110	0.089	0.418
KOOTOWIS CREEK (INDIAN RIVER)	17	8	0	11	0	0	0	11	0.000	0.750
LEINER RIVER	173	22	9	0	0	0	9	0	0.050	0.050
LENS CREEK	4	4	4	0	0	0	4	0	1.000	1.000
LITTLE QUALICUM RIVER	2896	592	14	965	296	554	310	1519	0.109	0.630
LITTLE ZEBALLOS RIVER	13	13	0	0	0	0	0	0	0.000	0.000
MACJACK RIVER	4	4	0	0	0	0	0	0	0.000	0.000
MAHATTA RIVER	9	4	4	9	0	0	4	9	0.500	1.500

Stream Name	Days fished	No. anglers	WILD		HATCHERY		TOTAL CATCH		Kept/ day**	Catch/ day**
			Kept	Released	Kept	Released	Kept	Released		
MARBLE RIVER (LINK CR, AMAZON R)	440	49	4	255	4	17	8	272	0.019	0.641
MEGIN RIVER	4	4	0	0	0	0	0	0	0.000	0.000
MOHUN CREEK (TROUT CREEK)	126	17	0	30	0	0	0	30	0.000	0.241
MUIR CREEK	69	30	4	9	0	0	4	9	0.063	0.188
NAHMINT RIVER	61	39	0	91	0	0	0	91	0.000	1.500
NAHMITTI RIVER	145	59	16	138	0	0	16	138	0.118	1.059
NANAIMO RIVER	2676	410	157	924	4	4	161	928	0.061	0.409
NIMPKISH RIVER	573	190	12	1095	0	0	12	1095	0.028	1.845
NITINAT RIVER	31	23	9	4	0	0	9	4	0.222	0.333
OYSTER RIVER	837	152	34	365	4	33	38	398	0.050	0.520
PACHENA RIVER	9	4	0	4	0	0	0	4	0.000	0.500
PERRY RIVER	4	4	4	0	0	0	4	0	1.000	1.000
PUNTLEDGE RIVER	1071	129	0	406	30	61	30	467	0.028	0.462
QUATSE RIVER	146	47	0	97	0	0	0	97	0.000	0.676
QUINSAM RIVER	2980	412	55	594	194	513	249	1107	0.083	0.455
RUSSIAN RIVER	47	13	4	26	0	0	4	26	0.091	0.636
SALMON RIVER	847	169	8	944	0	22	8	966	0.010	1.096
SAN JOSEF RIVER	25	17	0	0	0	0	0	0	0.000	0.000
SAN JUAN RIVER	374	103	60	320	0	0	60	320	0.158	1.000
SARITA RIVER	123	36	22	242	13	0	35	242	0.276	2.207
SOMASS RIVER	685	90	4	160	43	130	47	290	0.069	0.488
SOOKE RIVER	134	52	0	22	0	0	0	22	0.000	0.161
SPROAT RIVER	155	49	9	48	0	0	9	48	0.054	0.351
STAMP RIVER	4959	605	32	1464	563	1895	595	3359	0.120	0.792
STRAMBY RIVER (CACHE RIVER)	9	9	0	0	0	0	0	0	0.000	0.000
SUCWOA RIVER	87	22	13	30	0	0	13	30	0.150	0.500
TAHSIS RIVER	397	38	43	164	0	0	43	164	0.109	0.522
TAHSISH RIVER	37	16	22	8	0	0	28	8	0.556	0.778
TAYLOR RIVER	43	17	0	0	4	0	4	0	0.100	0.100
TLUPANA RIVER	15	10	2	2	0	0	2	2	0.250	0.500
TOQUART RIVER	18	10	0	15	0	0	0	15	0.000	0.800
TRENT RIVER	34	21	0	0	0	0	0	0	0.000	0.000
TSABLE RIVER	134	39	4	9	0	0	4	9	0.032	0.097
TSITIKA RIVER	9	4	0	74	0	0	0	74	0.000	8.500
TSOLUM RIVER	244	36	4	39	0	0	4	39	0.018	0.175
TSOWWIN RIVER	4	4	0	0	0	0	0	0	0.000	0.000
TSULQUATE RIVER	9	4	4	13	0	0	4	13	0.500	2.000
WAUKWAAS CREEK	191	53	38	299	0	0	38	299	0.217	1.783
WANOKANO CREEK	17	9	0	22	0	0	0	22	0.000	1.250
WHITE RIVER	39	22	0	13	0	0	0	13	0.000	0.333
WOSS RIVER	39	4	0	87	0	0	0	87	0.000	2.222
ZEBALLOS RIVER	69	16	0	52	0	0	0	52	0.000	0.706
TOTAL	41454	7350	1370	21389	1885	4925	3255	26314	0.080	0.718
LOWER MAINLAND COAST:										
ALOUETTE RIVER (SOUTH ALOUETTE RIVER)	3291	366	0	495	182	650	181	1145	0.055	0.403
ASHLU CREEK	54	15	12	35	0	0	12	35	0.214	0.857

Stream Name	Days fished	No. anglers	WILD		HATCHERY		TOTAL CATCH		Kept/ day**	Catch/ day**
			Kept	Released	Kept	Released	Kept	Released		
BERTRAM CREEK	8	4	0	0	0	0	0	0	0.000	0.000
BIRKENHEAD RIVER	15	4	0	4	0	0	0	4	0.000	0.250
BREM RIVER	31	12	12	8	0	0	12	8	0.375	0.625
CAPILANO RIVER	1259	201	2	224	46	58	48	282	0.039	0.261
CHAPMAN CREEK	155	31	23	46	4	0	27	46	0.175	0.475
CHEAKAMUS RIVER	1244	348	51	223	0	0	51	223	0.040	0.219
CHEHALIS RIVER	331	76	0	70	0	0	0	70	0.000	0.209
CHILLIWACK RIVER (VEDDER RIVER)	10953	1548	66	4201	198	260	264	4461	0.024	0.429
COQBURN CREEK	8	8	0	0	0	0	0	0	0.000	0.000
COQUIHALLA RIVER	938	335	0	121	15	15	15	136	0.016	0.158
COQUITLAM RIVER	597	100	0	236	8	4	8	240	0.013	0.413
DAKOTA CREEK	77	4	0	4	0	0	0	4	0.000	0.050
ELAHO CREEK	15	4	0	0	0	0	0	0	0.000	0.000
FRASER RIVER	9100	754	416	135	8	46	424	181	0.047	0.069
GRAY CREEK	12	8	0	4	0	0	0	4	0.000	0.333
HARRISON RIVER	26	15	0	0	0	0	0	0	0.000	0.000
HASTINGS CREEK	77	4	8	0	0	0	8	0	0.100	0.100
HORNET CREEK	31	8	4	4	0	0	4	4	0.125	0.250
INDIAN RIVER	96	27	7	66	0	0	7	66	0.080	0.760
KANAKA CREEK	112	27	4	4	0	0	4	4	0.034	0.069
KLITE RIVER	17	4	4	22	0	0	4	22	0.250	1.500
LANG CREEK (WOLFSOHN CREEK)	464	54	31	43	0	0	31	43	0.067	0.158
LILLOOET RIVER	65	16	4	0	0	8	4	8	0.063	0.188
LITTLE CAMPBELL RIVER	1245	112	19	220	66	39	85	259	0.068	0.276
LITTLE TOBA RIVER	4	4	4	4	0	0	4	4	1.000	2.000
LYNN CREEK	108	23	0	62	0	0	0	62	0.000	0.571
MCNAB CREEK	4	4	4	12	0	0	4	12	1.000	4.000
MAMQUAM RIVER	225	51	4	39	0	0	4	39	0.017	0.190
NICOMEKL RIVER	538	81	0	31	15	12	15	43	0.029	0.108
NORRISH CREEK	62	23	0	8	0	0	0	8	0.000	0.125
NORTH ALOUETTE RIVER	166	35	0	39	4	0	4	39	0.023	0.256
PHILLIPS RIVER	4	4	0	0	0	0	0	0	0.000	0.000
PITT RIVER	62	19	0	43	0	0	0	43	0.000	0.688
POWELL RIVER	4	4	0	8	0	0	0	8	0.000	2.000
QUATAM RIVER	4	4	0	0	0	0	0	0	0.000	0.000
RAINY RIVER	174	27	12	27	0	0	12	27	0.067	0.222
SALMON RIVER	8	4	0	0	0	0	0	0	0.000	0.000
SECHELT CREEK	19	8	0	0	0	0	0	0	0.000	0.000
SERPENTINE RIVER	12	12	0	0	0	0	0	0	0.000	0.000
SEYMOUR RIVER	1627	252	4	291	20	31	24	322	0.014	0.210
SILVERDALE CREEK	4	4	0	0	0	0	0	0	0.000	0.000
SILVERHOPE CREEK (SILVER CREEK)	97	15	4	8	0	0	4	8	0.040	0.120
SOUTHGATE RIVER	23	4	12	39	0	0	12	39	0.500	2.167
SPUZZUM CREEK	4	4	0	0	0	0	0	0	0.000	0.000
SQUAMISH RIVER	1526	427	75	323	8	0	83	323	0.054	0.272
STAVE RIVER	93	23	0	4	0	0	0	4	0.000	0.042
SUMAS RIVER	387	31	8	23	0	0	8	23	0.020	0.080
TOBA RIVER	52	8	20	13	0	0	20	13	0.385	0.615
TZOONIE RIVER	4	4	0	4	0	0	0	4	0.000	1.000
BEAVER CREEK	35	12	0	43	0	0	0	43	0.000	1.222

Stream Name	Days fished	No. anglers	WILD		HATCHERY		TOTAL CATCH		Kept/ day**	Catch/ day**
			Kept	Released	Kept	Released	Kept	Released		
WHONOCK CREEK	15	8	0	0	0	0	0	0	0.000	0.000
WIDGEON CREEK	4	4	0	0	0	0	0	0	0.000	0.000
TOTAL	35486	5184	810	7186	574	1123	1384	8309	0.039	0.271
THOMPSON-NICOLA:										
BRIDGE RIVER	230	34	8	9	0	3	8	12	0.028	0.085
CAYOOSH RIVER	439	26	30	8	0	0	30	8	0.070	0.086
NAHATLATCH RIVER	246	59	38	18	0	0	38	18	0.149	0.224
NICOLA RIVER	14	9	0	0	0	0	0	0	0.000	0.000
NORTH THOMPSON RIVER	87	19	0	0	0	0	0	0	0.000	0.000
SETON RIVER	3	3	0	0	0	0	0	0	0.000	0.000
SOUTH THOMPSON RIVER	475	54	40	3	0	0	40	3	0.092	0.099
SPIUS CREEK	6	3	0	0	0	0	0	0	0.000	0.000
STEIN RIVER	24	7	0	0	0	0	0	0	0.000	0.000
THOMPSON RIVER	12176	2249	1804	2297	22	28	1826	2325	0.151	0.337
TOTAL	13700	2463	1920	2335	22	31	1942	2366	0.143	0.312
CARIBOO:										
ATNARKO RIVER	730	190	92	90	0	0	92	90	0.126	0.280
BELLA COOLA RIVER	4094	760	584	1434	9	32	593	1466	0.148	0.607
BLACKWATER RIVER (WESTROAD RIVER)	91	18	2	186	0	0	2	186	0.019	2.058
CHILCOTIN RIVER	531	142	67	165	0	0	67	165	0.117	0.460
CHILKO RIVER	51	31	4	0	0	0	4	0	0.063	0.063
CHUCKWALLA RIVER	85	37	43	122	0	0	43	122	0.439	1.902
CLYAK RIVER	4	2	0	0	0	0	0	0	0.000	0.000
DEAN RIVER	3664	660	457	4943	18	80	475	5023	0.116	1.654
KILBELLA RIVER	43	25	20	77	0	0	20	77	0.364	1.864
KOEYE RIVER	4	2	0	0	0	0	0	0	0.000	0.000
NEKITE RIVER	4	4	0	0	0	0	0	0	0.000	0.000
TALCHAKO RIVER	4	4	0	0	0	0	0	0	0.000	0.000
TOTAL	9305	1875	1269	7017	27	112	1296	7129	0.133	1.080
SKEENA MAINLAND:										
BABINE RIVER	1831	352	100	1711	5	7	105	1718	0.044	1.030
BEAR RIVER	13	7	0	4	0	0	0	4	0.000	0.200
BISH CREEK	7	4	0	0	0	0	0	0	0.000	0.000
BOULDER CREEK	9	4	9	4	0	0	9	4	1.000	1.500
BULKLEY RIVER	10816	1451	1371	3230	14	39	1385	3269	0.129	0.451
CANOONA RIVER	4	4	0	15	0	0	0	15	0.000	4.000
CEDAR CREEK	13	7	3	16	0	0	3	16	0.250	1.500
CLEARWATER CREEK	9	2	3	14	0	0	3	14	0.400	2.000
CLORE RIVER	61	28	19	27	0	0	19	27	0.263	0.789
CRANBERRY RIVER	640	197	99	221	3	6	102	227	0.163	0.498

Stream Name	Days fished	No. anglers	WILD		HATCHERY		TOTAL CATCH		Kept/ day**	Catch/ day**
			Kept	Released	Kept	Released	Kept	Released		
DANDOCHAX CREEK	26	5	4	67	0	0	4	67	0.133	2.667
EXCHAMSIKS RIVER	31	13	0	0	0	0	0	0	0.000	0.000
EXSTEW RIVER	11	7	0	0	0	0	0	0	0.000	0.000
FOOTE CREEK (BEAVER RIVER)	33	15	7	19	0	0	7	19	0.222	0.778
GITNADOIX RIVER	62	14	4	15	0	0	4	15	0.059	0.294
ILLIANCE RIVER	4	4	0	0	0	0	0	0	0.000	0.000
INKLIN RIVER	33	7	11	52	0	0	11	52	0.333	1.889
ISHKEENICKH RIVER	31	15	0	11	0	0	0	11	0.000	0.273
KASIKS RIVER	30	11	0	0	0	0	0	0	0.000	0.000
KEMANO RIVER	7	4	4	0	0	0	4	0	0.500	0.500
KHYEX RIVER	25	5	3	3	0	0	3	3	0.167	0.333
KISPIOX RIVER	1760	314	43	530	0	35	43	565	0.024	0.370
KITEEN RIVER	127	27	22	22	0	0	22	22	0.182	0.364
KITIMAT RIVER	2157	361	147	173	7	28	154	201	0.070	0.162
KITSUMKALUM RIVER (KALUM RIVER)	4037	531	459	1003	0	4	459	1007	0.114	0.360
KITWANCOOL RIVER	137	7	6	38	0	0	6	38	0.053	0.368
KITWANGA RIVER	140	25	22	4	0	0	22	4	0.150	0.175
KLEANZA CREEK	4	4	0	4	0	0	0	4	0.000	1.000
KLOIYA RIVER	600	89	33	59	0	0	33	59	0.056	0.154
KWINAMASS RIVER	33	19	19	33	0	0	19	33	0.556	1.556
LACHMACH RIVER	7	4	0	0	0	0	0	0	0.000	0.000
LAKELSE RIVER	2857	430	173	651	0	0	173	651	0.060	0.282
LITTLE KEDEENE RIVER	81	7	0	7	0	0	0	7	0.000	0.091
MEZIADIN RIVER	66	29	4	0	0	0	4	0	0.056	0.056
MORICE RIVER	5562	992	643	1980	23	24	666	2004	0.113	0.542
NAKINA RIVER	44	15	9	22	0	0	9	22	0.200	0.667
NASS RIVER	207	59	11	17	0	0	11	17	0.051	0.153
SHAMES RIVER	96	11	12	12	0	0	12	12	0.159	0.318
SKEENA RIVER	9945	1201	980	1019	65	15	1045	1034	0.1?4	0.220
STIKINE RIVER	19	12	3	0	0	0	3	0	0.143	0.143
SUSKWA RIVER (BEAR RIVER)	439	109	37	33	0	0	37	37	0.085	0.202
SUSTUT RIVER	290	105	68	142	0	0	68	142	0.215	0.760
TAHLTAN RIVER	156	62	78	102	0	4	78	106	0.510	1.184
TATSAMENIE RIVER (TATSATUA RIVER)	12	2	2	0	0	0	2	0	0.143	0.143
TELKWA RIVER	109	20	4	5	0	0	4	5	0.030	0.091
TROUT CREEK	35	16	3	7	0	0	3	7	0.091	0.273
TSEAX RIVER	132	48	29	101	0	0	29	101	0.250	1.083
ZYMAGOTITZ RIVER (ZIMACOR RIVER)	26	15	4	30	0	0	4	30	0.143	1.286
ZYMOETZ RIVER (COPPER RIVER)	1531	324	260	406	5	7	265	413	0.179	0.452
TOTAL	44305	6998	4708	11809	122	173	4830	11982	0.109	0.410

Stream Name	Days fished	No. anglers	WILD		HATCHERY		TOTAL CATCH		Kept/ day**	Catch/ day**
			Kept	Released	Kept	Released	Kept	Released		
QUEEN CHARLOTTE ISLANDS:										
AMUN RIVER	7	4	0	11	0	0	0	11	0.000	1.500
BRAVERMAN CREEK	4	4	0	7	0	0	0	7	0.000	2.000
COPPER CREEK	582	64	41	470	0	0	41	470	0.070	0.873
DATLAMEN CREEK	4	4	0	0	0	0	0	0	0.000	0.000
DAVIDSON CREEK	19	4	8	12	0	0	8	12	0.400	1.000
DEENA CREEK	147	40	15	100	0	0	15	100	0.093	0.721
HIELLEN RIVER	63	15	0	19	0	0	0	19	0.000	0.294
HONNA RIVER	131	41	52	108	0	0	52	108	0.400	1.229
HAMIN RIVER	216	72	67	234	0	0	67	234	0.310	1.397
HATHERS CREEK	11	7	4	33	0	0	4	33	0.333	3.333
HORESBY LAKE	7	4	0	0	0	0	0	0	0.000	0.000
NADEN RIVER	77	4	15	23	0	0	15	23	0.200	0.500
PALLANT CREEK	293	50	17	511	0	0	17	511	0.095	1.917
ROY CREEK	23	4	0	15	0	0	0	15	0.000	0.667
SKEDANS CREEK	7	4	0	56	0	0	0	56	0.000	7.500
TASU CREEK	19	4	0	0	0	0	0	0	0.000	0.000
TLELL RIVER	175	69	29	166	0	0	29	166	0.192	1.115
WRIGHT LAKE CREEK	19	4	0	0	0	0	0	0	0.000	0.000
YAKOUN RIVER	2330	341	480	2567	0	0	480	2567	0.201	1.307
TOTAL	4134	739	728	4332	0	0	728	4332	0.177	1.234
OMINECA-PEACE:										
STELLAKO RIVER	7	4	0	0	0	0	0	0	0.000	0.000
TOTAL	7	4	0	0	0	0	0	0	0.000	0.000
UNKNOWN STREAMS:	804	285	44	191	4	3	48	194	0.059	0.267
PROVINCIAL TOTALS:	149195	24898	10849	54259	2634	6367	13483	60626	0.094	0.517

* Anglers who did not report number of days fished are not included in this report.
** Calculated from reported number of fish caught.

Appendix 2. Steelhead licencees, active and successful anglers, catch and angling effort (1966-67 to 1982-83).

Seasons	Licencees	Active Anglers	Successful Anglers	Successful Anglers (%)	Total Catch	Days Fished	Catch/ Successful Angler	Days Fished/ Active Angler	Days Fished/ Fish Caught
66-67*	37,500	27,125	11,121	41.0	66,373	N.A.	5.9	N.A.	N.A.
67-68	39,388	22,289	8,167	36.6	48,508	224,300	5.9	10.1	4.6
68-69	39,775	19,789	7,834	39.6	41,672	189,300	5.3	9.6	4.5
69-70	45,824	24,515	8,339	34.0	37,219	249,452	4.5	10.2	6.7
70-71	43,750	23,533	8,128	34.5	53,916	232,664	6.6	9.9	4.3
71-72**	26,253	18,270	7,934	43.4	61,457	184,978	7.7	10.1	3.0
72-73	28,992	19,489	8,165	41.9	61,609	203,393	7.5	10.4	3.3
73-74	31,315	20,291	8,282	41.0	58,933	208,105	7.1	10.3	3.5
74-75**	24,399	16,469	7,296	44.3	51,652	196,751	7.1	11.9	3.8
75-76	29,594	20,265	8,770	43.3	58,036	219,797	6.6	10.8	3.8
76-77	25,539	18,356	6,998	38.1	40,618	186,381	5.8	10.2	4.6
77-78	23,406	17,143	7,038	41.1	45,201	174,721	6.4	10.2	3.9
78-79	24,600	15,788	6,746	42.7	39,473	159,363	5.9	10.1	4.0
79-80	25,095	14,755	6,384	43.3	39,569	134,569	6.2	9.1	3.4
80-81	22,301	12,894	6,383	49.5	50,924	131,886	8.0	10.2	2.6
81-82	23,425	12,964	6,175	47.6	57,704	126,508	9.3	9.7	2.2
82-83**	20,856	14,475	7,686	53.1	74,109	149,195	9.6	10.3	2.0

* Estimated on the basis of incomplete licencing data.
** Increase in steelhead licence fees.

Appendix 3. Estimated annual steelhead catch (1966-67 to 1982-83).

Seasons	Wild		Hatchery		Combined Catch		Total
	Kept	Released	Kept	Released	Kept	Released	
1966-67							66,373
1967-68							48,508
1968-69							41,672
1969-70							37,219
1970-71					33,977	19,939	53,916
1971-72					36,733	24,724	61,457
1972-73					35,939	25,670	61,609
1973-74					32,720	26,213	58,933
1974-75					27,807	23,845	51,652
1975-76					31,490	26,546	58,036
1976-77					20,168	20,450	40,618
1977-78					18,154	27,047	45,201
1978-79					14,725	24,748	39,473
1979-80					12,663	26,906	39,569
1980-81					10,941	39,983	50,924
1981-82	8,640	43,139	1,361	4,600	9,965	47,739	57,704
1982-83	10,849	54,259	2,634	6,367	13,483	60,626	74,109